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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/561,815	03/10/2006	Stefan Spiekermann	1003301-000251	2856

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EXAMINER
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CARTER, MICHAEL W

ART UNIT	PAPER NUMBER
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2809

MAIL DATE	DELIVERY MODE
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07/25/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

Application No.

10/561,815

Applicant(s)

SPIEKERMANN, STEFAN

Examiner

Michael Carter

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 21 December 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 December 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 12/21/2005.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

**DETAILED ACTION**

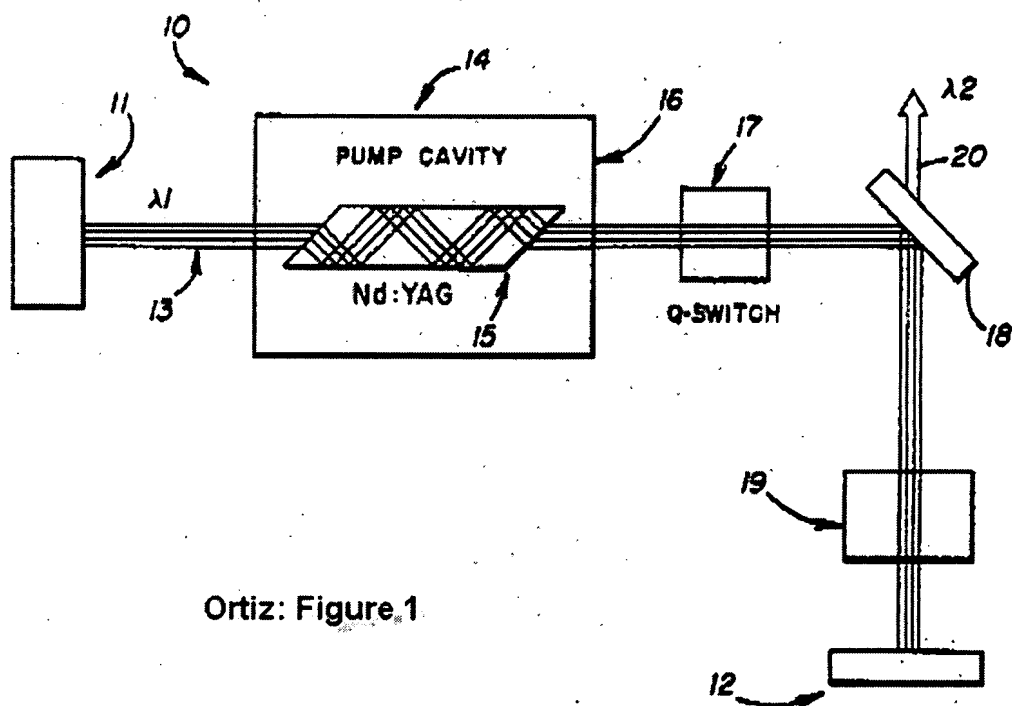
1. The information disclosure statement filed 3/10/2006 fails to comply with 37 CFR 1.98(a)(1), which requires the following: (1) a list of all patents, publications, applications, or other information submitted for consideration by the Office; (2) U.S. patents and U.S. patent application publications listed in a section separately from citations of other documents; (3) the application number of the application in which the information disclosure statement is being submitted on each page of the list; (4) a column that provides a blank space next to each document to be considered, for the examiner's initials; and (5) a heading that clearly indicates that the list is an information disclosure statement. The information disclosure statement has been placed in the application file, but the information referred to therein has not been considered.

***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-3, 6-7, 11-12, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ortiz US Patent 5,231,641 (hereinafter referred to as Ortiz) in view of Cohen et al. US Patent 4,413,342 (hereinafter referred to as Cohen).



Ortiz: Figure 1

4. For claim 1, Ortiz teaches, A laser arrangement, comprising a resonant cavity that is resonant to one or more fundamental frequencies; a solid state laser material provided in the resonant cavity for emitting at least one of said one or more fundamental frequencies when being irradiated by pump light; pumping means for providing pump light to said laser material; a non-linear optical element provided in the resonant cavity (label 19), said non-linear optical element being adapted to convert one or more of said fundamental frequencies into a frequency converted beam (figure 1). Ortiz also teaches using a mirror as an output coupler, which is highly reflective at the cavity mode wavelength and transmissive at the output wavelength (column 3, lines 65-67).

Ortiz does not teach wherein at least one cavity mirror defining the resonant cavity is highly transmitting for said frequency converted beam; wherein a quarter wave-plate and a retro-reflector for the frequency converted beam are arranged in series in

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the beam path outside the cavity adjacent to said cavity mirror, such that the frequency converted beam leaving the cavity through said mirror undergoes a polarization rotation and re-enters the cavity in a polarization state orthogonal to its original polarization state.

However, Cohen teaches a quarter wave-plate (figure 1, label 20) and a retro-reflector (figure 1, label 22) for the frequency converted beam are arranged in series in the beam path outside the cavity, such that the frequency converted beam leaving the cavity through a mirror undergoes a polarization rotation and re-enters the cavity in a polarization state orthogonal to its original polarization state in order to provide coincident orthogonally-polarized beams (abstract) and provide a stable and highly efficient means for frequency-doubling a laser beam (column 2, lines 62-64).

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to combine Ortiz's device with Cohen's quarter wave plate and reflector, by coupling the output wavelength through a mirror which is highly reflective at the cavity mode wavelength and transmissive at the output wavelength, in place of the end cavity mirror (Ortiz, figure 1, label 12) in order to provide coincident orthogonally-polarized beams and provide a stable and highly efficient means for frequency-doubling a laser beam.

5. For claim 2, Ortiz in view of Cohen teaches the cavity is defined by a first cavity mirror, a second cavity mirror and a folding mirror, said folding mirror defining a first cavity branch between said folding mirror and the first cavity mirror and defining a second cavity branch between said folding mirror and the second cavity mirror, the non-

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linear element being provided in the second branch, and wherein the folding mirror is highly transmitting for the frequency converted beam (Ortiz, figure 1). The second cavity mirror is highly transmitting for the frequency converted beam as discussed for the combination in claim 1.

6. For claim 3, Cohen teaches the retro-reflector (figure 1, label 22) has a radius of curvature and a position with respect to the resonant cavity in order for two cross-polarized output beams to overlap spatially and exit said cavity as a single beam (abstract).

7. For claims 6, 11, 12, and 15 Ortiz teaches the laser material comprises a neodymium-doped crystal selected from YAG,  $\text{YVO}_4$  and  $\text{GdVO}_4$  (figure 1).

8. For claim 7, Cohen teaches the retro-reflector has a radius of curvature and a position with respect to the resonant cavity in order for two cross-polarized output beams to overlap spatially and exit said cavity as a single beam (abstract).

9. Claims 4, 8-10, 13 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ortiz in view of Cohen, and further in view of Adams PG Pub, US 2002/0141457 (hereinafter referred to as Adams).

10. For claims 4, 8-10, 13 and 16 Ortiz in view of Cohen remains applied as above.

11. For claims 4, and 8-10, Ortiz in view of Cohen does not teach the non-linear element comprises a quasi phase-matching grating.

However, Adams does teach the non-linear element comprises a quasi phase-matching grating in order to ensure high efficiency (paragraph 36, lines 12-16).

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It would have been obvious to one of ordinary skill in the art, at the time the invention was made to combine Ortiz in view of Cohen with Adams' quasi phase-matching grating in order to ensure high efficiency.

12. For claims 13, and 16 Ortiz teaches the laser material comprises a neodymium-doped crystal selected from YAG,  $\text{YVO}_4$  and  $\text{GdVO}_4$  (figure 1).

13. Claims 5 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ortiz in view of Cohen, and Adams and further in view of Miyake US Patent 6,208,673 (hereinafter referred to as Miyake).

14. For claims 5 and 14, Ortiz in view of Cohen, and Adams remains applied as above.

15. For claim 5, Ortiz teaches the non-linear element comprises a potassium-titanyl-phosphate (KTP) crystal (figure 1).

Ortiz in view of Cohen and Adams does not teach the crystal is periodically poled.

However, Miyake does teach the KTP is periodically poled in order to have a material with high non-linear gain, but does not suffer from double refraction losses (column 5, lines 43-52).

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to combine the periodic poling of Miyake with the device of Ortiz in view of Cohen and Adams in order to have a material with high non-linear gain, but does not suffer from double refraction losses.

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16. For claim 14, Ortiz teaches the laser material comprises a neodymium-doped crystal selected from YAG, YVO<sub>4</sub> and GdVO<sub>4</sub> (figure 1).

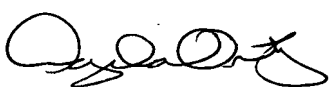
### **Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Carter whose telephone number is (571) 270-1872. The examiner can normally be reached on Monday-Friday, 7:00 a.m.- 4:30 p.m., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Angela Ortiz can be reached on (571) 272-1206. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

  
MC

  
ANGELA ORTIZ  
SUPERVISORY PATENT EXAMINER

7/2007